

PEOSIDRILOIDES, A NEW GENUS, AND
NEW RECORDS OF *PEOSIDRILUS*
(OLIGOCHAETA: TUBIFICIDAE) FROM THE
UNITED STATES, WITH THE DESCRIPTION OF A
NEW SPECIES FROM THE GULF OF MEXICO

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Abstract.—*Peosidrilus biprostatatus* Baker & Erséus, 1979, is recorded from the Gulf of Mexico, *P. coeloprostatus* (Cook, 1969) from Maine, and both *P. biprostatatus* and *P. acochlearis* (Erséus & Loden, 1981) are reported from bathyal depths (off North Carolina) for the first time. *Peosidriloides*, new genus, does not have lateral spermathecal pores, the feature regarded as an autapomorphy of *Peosidrilus* Baker & Erséus, 1979. *Peosidriloides hornensis*, new species, from the northern Gulf of Mexico, shares some apomorphic features (a short clitellum, long vasa deferentia) with *Peosidriloides flabellifer* (Erséus, 1984), new combination, but is distinguished from that species by its more numerous anterior setae, its more ventral spermathecal pores, its wider vasa deferentia, and its possession of penial organs.

The marine tubificid genus *Peosidrilus* was established by Baker & Erséus (1979) to accommodate one species, *P. biprostatatus* Baker & Erséus, 1979, from the east coast of the United States (New Jersey and North Carolina). Although this species was transferred to *Phallogdrilus* Pierantoni, 1902 in a subsequent paper by Erséus (1984), *Peosidrilus* was resurrected when the paraphyletic taxon *Phallogdrilus* was split into a number of genera (Erséus 1992). *Peosidrilus* was then recognized by the assumedly autapomorphic, lateral, position of the spermathecal pores, and was enlarged to include fourteen species; however, one species (*P. flabellifer* Erséus, 1984) with spermathecal pores located in line with the ventral setae was included in this genus too.

Many species of *Peosidrilus* are recorded from shallow-water or continental shelf bottoms of the northwestern part of the Atlantic Ocean; one, *P. simplidentatus* (Erséus, 1979a), is a High Arctic deep-sea form. An Atlantic origin of the genus has therefore been suggested (Erséus 1992).

The present paper presents geographic as well as bathymetric range extensions of three North Atlantic species. *Peosidrilus biprostatatus* and *P. acochlearis* (Erséus & Loden, 1981) are recorded from the continental slope off North Carolina, *P. biprostatatus* also from the Gulf of Mexico, and *P. coeloprostatus* (Cook, 1969) is reported from as far north as Maine. Moreover, a new species, described from the northern Gulf of Mexico, as well as *P. flabellifer*, are attributed to a new genus.

The new material studied originates from three sources: (1) the Study of Biological Resources on the U.S. South Atlantic Continental Slope and Rise (Blake et al. 1987), supported by contract number 14-12-0001-30064 from the U.S. Department of Interior, Minerals Management Service, to Battelle New England Research Laboratory, Woods Hole Oceanographic Institution, and Lamont-Doherty Geological Observatory (courtesy Dr. Nancy Maciolek-Blake), (2) oligochaetes collected at Perdido Key, near Pensacola, northwestern Florida, and Horn

Island, off the coast of Mississippi, by Dr. J. McLelland, Gulf Coast Research Laboratory, Ocean Springs, Mississippi, and (3) material from a study of trophic coupling and benthos in Sheepscot River, Maine (Dr. L. Watling and Dr. R. Langton, principal investigators; courtesy also Ms. L. McCann; University of Maine, Darling Marine Center).

The specimens were stained in paracarmine and mounted whole in Canada balsam. Material of the species is deposited in the United States Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C., the Swedish Museum of Natural History (SMNH), Stockholm, and in the reference collection of Darling Marine Center.

Peosidrilus Baker & Erséus, 1979

Peosidrilus Baker & Erséus, 1979:505–506.—(In part) Erséus 1992:27.

Adelodrilus Cook (in part).—Erséus & Loden 1981:823.

Phallodrilus Pierantoni (in part); Erséus 1979a:203.—Erséus 1984:823.—Erséus 1990:54.

Diagnosis (modified after Erséus 1992) (assumed autapomorphy in italics).—Marine tubificids. Somatic setae bifid, with upper tooth thinner and shorter than lower. Penial setae, when present, generally with clubbed ectal ends, each bearing an apical hook; however, in some species the ‘clubs’ are indistinct, or even absent. Penial setae small, generally straight, and numerous in bundle. *Spermathecal pores lateral*, or in line with dorsal setae [*P. dorsospermatheca*]. Vasa deferentia ciliated, narrow in all but one species [vasa much dilated in *P. acochlearis*], entering apical ends of atria. Atria generally somewhat elongate, more or less horizontal and curved; occasionally short and almost erect. Each atrium with two prostate glands, anterior one attached at entrance of vas deferens, posterior one attached to ectal end of atrium. Atria either

opening directly to exterior through simple pores, small male projections, or true pendent penes; copulatory sacs absent or present. Spermathecae of varying shape; spermathecal vestibules present in a few species.

Type species.—*Peosidrilus biprostatus* Baker & Erséus, 1979.

Other species.—Twelve species listed by Erséus (1992); i.e., excluding *P. flabellifer*, which is transferred to *Peosidriloides*, new genus, below.

Remarks.—*Peosidrilus* was revised by Erséus (1992) to include a number of species formerly regarded as members of *Phallodrilus*, primarily those species that have clubbed, apically hooked penial setae, and lateral spermathecal pores, the latter feature considered as a possible autapomorphy of *Peosidrilus*. However, the genus is heterogeneous. Due to the lack of distinct synapomorphies, other species have been included on the basis of overall (partly symplesiomorphic) similarity with the more typical members. With the removal of *Peosidriloides flabellifer*, new combination, however, *Peosidrilus* is now more unambiguously diagnosed by its lateral spermathecal pores. The dorsal position of the pores in *P. dorsospermatheca* can be regarded as a secondary transformation from the lateral position.

Peosidrilus may have to be revised again when new information becomes available. Other taxa with clubbed, apically hooked penial setae (*Adelodrilus* Cook, 1969, *Bermudrilus* Erséus, 1979b) will then also have to be considered (see Erséus 1992).

Peosidrilus biprostatus
Baker & Erséus, 1979

Peosidrilus biprostatus Baker & Erséus, 1979: 506–508, figs. 1–2.—Erséus & Loden 1981:819–820.—Erséus 1992:27, fig. 12F. *Phallodrilus biprostatus*; Erséus 1984:819–820.—Erséus 1986:296–297.—Davis 1985:table 1.

New material.—USNM 169815, 1 spec-

imen from off Cape Fear, North Carolina, U.S.A., 32°32.22'N, 77°15.31'W, 605 m, sand, South Atlantic cruise 5, station 14A, box core 3 (20 Sep 1985; see Blake et al. 1987). USNM 169816, 1 specimen from 800 m off Perdido Key (Gulf of Mexico), near Pensacola, Florida, U.S.A., about 6 m, sand, station A 0920C89C (collected by J. McLelland, October 1989).

Remarks.—The specimen from 605 m depth off North Carolina represents the deepest record of this species; *P. biprostatus* has never been found deeper than 73 m before (Baker & Erséus 1979). The worm is not complete. It is 3.5 mm long, comprising anterior 21 segments only. Its penial setae are about 9 per bundle.

The Perdido Key material provides the first record of *P. biprostatus* from the Gulf of Mexico. The single worm is the smallest (complete, and sexually mature) individual of the species reported to date; it is 4.5 mm long, with about 38 segments. The penial setae appear to be 6 on one side of worm, whereas the penial setae and male efferent duct are not developed on the other side.

Distribution and habitat.—NW Florida (first record for Gulf of Mexico), eastern United States (Florida through Massachusetts). Largely coarse sand, known from 5.5–605 m depth.

Peosidrilus acochlearis
(Erséus & Loden, 1981)

Adelodrilus acochlearis Erséus & Loden, 1981:821–823, figs. 1B–C, 2.—Erséus 1983:77–78.

Phallodrilus acochlearis; Erséus 1986:297–298, fig. 7.

Peosidrilus acochlearis; Erséus 1992:27.

New material.—USNM 169817–169818, 2 specimens from off Cape Fear, North Carolina, U.S.A., 32°32.22'N, 77°15.31'W, 605 m, sand, South Atlantic cruise 5, station 14A, box core 3 (20 Sep 1985; see Blake et al. 1987).

Remarks.—One of the two specimens is

complete: 3.6 mm long, with 36 segments. This specimen has a few modified bifid setae, with much prolonged lower teeth, in some dorsal bundles of the posteriormost segments (see Erséus & Loden 1981:fig. 1C). The new material conforms to the previous descriptions in other characters too, but one individual appears to have at least 15 penial setae per bundle. Previously described material had maximally 14 such setae per bundle (Erséus 1986).

This species had not been collected deeper than 11 m before. The present record is from a continental slope station.

Distribution and habitat.—East coast of the United States (Florida through North Carolina). Sand, known from 5.5–605 m depth.

Peosidrilus coeloprostatatus (Cook, 1969)

Phallodrilus coeloprostatatus Cook, 1969:16–17, fig. 5.—Erséus 1979a:189–190, fig. 4.—Erséus 1984:813–815, fig. 1.

Peosidrilus coeloprostatatus; Erséus 1992:27.

New material.—USNM 169819–169823 (5 specimens) and Darling Marine Center reference collection (3 specimens), all from Outer Sheepscot Bay, Maine, 43°43.10'N, 69°43.40'W, Station B7, 37 m, coarse sand and gravel with a large amount of vascular plant detritus, annual salinity range 32.4–33.2‰ (collected by L. Watling, 8 Sep 1988). SMNH Main coll. 1414, 4 specimens from same area, kind of sediment, collector and date, but 43°42.85'N, 69°43.65'W (Station B9), 38 m.

Remarks.—The new material from Sheepscot River conforms well to the previous descriptions. The specimens are 3.9–7.2 mm long, with 38–78 segments. Their penial setae are about 35–50 μm long, (8)9–15(16) per bundle.

This species has been reported from as far south as Maryland/Delaware (Diaz et al. 1987), but not north of Massachusetts (Cook 1969) before.

Distribution and habitat.—East coast of United States (Maryland through Maine; new record for Maine). Sand, known from 3.4–78 m depth.

Peosidriloides, new genus

Phallodrilus Pierantoni (in part); Erséus 1984:823.

Peosidrilus Baker & Erséus (in part); Erséus 1992:27.

Etymology.—Named for its resemblance (-oides Greek for ‘resembling’) to *Peosidrilus*. The type species was previously classified as a member of that genus.

Diagnosis.—(assumed autapomorphies in italics).—Marine tubificids. Somatic setae bifid. *Clitellum* short, maximally extending over posterior third of segment X, whole XI, and anterior two thirds of XII. Somatic setae bifid, with upper tooth thinner and shorter than lower. Penial setae with single-pointed, curved tips (tips also somewhat clubbed in *P. flabellifer*). Penial setae small, numerous, densely packed, generally over 10 per bundle. Spermathecal pores in line with ventral setae, or even ventral to this line. *Vasa deferentia* ciliated, narrow, several times longer than atria, entering apical ends of atria. Atria cylindrical or somewhat spindle-shaped, horizontal, but slightly curved towards male pores; latter simple (*P. flabellifer*) or as penis-like organs (*P. hornensis*). Each atrium with two prostate glands, anterior one attached at entrance of vas deferens, posterior one attached to ectal end of atrium. Spermathecae with discrete ducts and thin-walled ampullae; spermathecal vestibules not distinct.

Type species.—*Phallodrilus flabellifer* Erséus, 1984.

Other species.—*Peosidriloides hornensis*, new species.

Remarks.—The inclusion of *Phallodrilus flabellifer* in *Peosidrilus* was problematic as this species does not have lateral spermathecal pores, which is the assumed autapo-

morphy of *Peosidrilus* (see Erséus 1992; and above). With regard to the (ventral) location of the spermathecal pores, the new genus *Peosidriloides* is plesiomorphic.

The penial setae of *Peosidriloides hornensis* and *P. flabellifer* have tips that are either unmodified (Erséus 1992: fig. 1D, state 0), or with indistinct ectal swellings (Erséus 1992: fig. 1D, state 3), both relatively plesiomorphic conditions vis-à-vis the distinctly clubbed penial setae (Erséus 1992: fig. 1D, state 4) found in most species of *Peosidrilus*, *Adelodrilus* and *Bermudrilus*. The new genus therefore may be phylogenetically separated from these other genera. Monophyly of *Peosidriloides* is supported by the unusually short clitellum, and the very long vasa deferentia.

Both species of *Peosidriloides* are from the Northwest Atlantic.

Peosidriloides flabellifer (Erséus, 1984),
new combination

Phallodrilus flabellifer Erséus, 1984:818–819, fig. 4.

Peosidrilus flabellifer; Erséus 1992:27.

Remarks.—As argued above, this species is better placed outside *Peosidrilus*. The distinguishing features of *P. flabellifer* and *P. hornensis* are noted in Remarks for the latter below.

Distribution and habitat.—Georges Bank, off Massachusetts (Northwest Atlantic). Coarse sand, 78–79 m depth.

Peosidriloides hornensis, new species
Fig. 1

Holotype.—USNM 169824, whole-mounted specimen.

Type locality.—N shore of about the middle of Horn Island, about 11 km off the coast of the state of Mississippi, northern Gulf of Mexico, swash and supratidal zones in an area severely impacted by an oil spill, Station no. 11 (collected by J. McLelland, 21 Sep 1989).

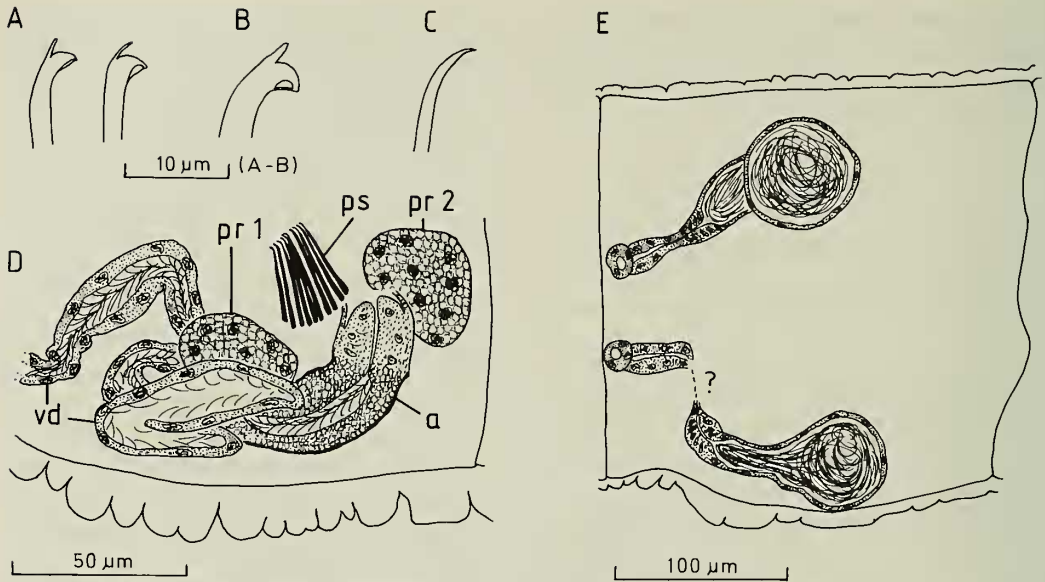


Fig. 1. *Peosidriloides hornensis*, new species. A, Free-hand drawing of anterior somatic setae; B, Free-hand drawing of postclitellar somatic seta; C, Free-hand drawing of penial seta; D, Male genitalia in segment XI; E, Spermathecae in segment X (one spermatheca slightly damaged). Abbreviations: a, atrium; pr 1, anterior prostate gland; pr 2, posterior prostate gland; ps, penial seta; vd, vas deferens.

Paratypes.—USNM 169825 and SMNH Type coll. 4632, 2, whole-mounted specimens from type locality.

Etymology.—Named for Horn Island.

Description.—Length of two USNM specimens, 8.2 and 6.1 mm, 59 and 60 segments respectively (SMNH specimen not complete). Width at clitellum (fixed, compressed specimens) 0.32–0.39 mm. Prostomium rounded, well set off from peristomium. Clitellum extending over $\frac{2}{3}$ X– $\frac{2}{3}$ XII, well developed in all specimens. Somatic setae (Fig. 1A–B) bifid, with upper tooth shorter and distinctly thinner than lower, and with subdental ligaments. These setae generally 35–50 μ m long, 2.5–3.5 μ m thick (smaller in a few anteriormost segments), two or three (occasionally four) per bundle anteriorly, two per bundle in postclitellar segments. Penial setae (Fig. 1C; D, *ps*) single-pointed, 25–35 μ m long, 1–2 μ m thick, about 7–12 per bundle (exact numbers difficult to establish), with curved, thin tips (details not clear); setae densely packed

within bundle. Male and spermathecal pores paired, both pairs ventral to lines of ventral setae; pores thus rather close to each other within each pair (see Fig. 1E). Male pores posteriorly in segment XI, spermathecal pores in most anterior part of X.

Pharyngeal glands in segments IV–V. Male genitalia (Fig. 1D) paired. Vas deferens variably wide (ectal part dilated, up to about 15–20 μ m wide), coiled, several times longer than atrium, appear to enter apical end of latter (details not clear). Atrium cylindrical or somewhat spindle-shaped, slightly curved, 45–60 μ m long, 20–22 μ m wide, with very thin outer (muscle) lining, and granulated and ciliated inner epithelium. Atrium terminating in simple copulatory organ; probably a penis, but difficult to see whether organ is fully pendent within a penial sac. Copulatory organ 23–28 μ m long, 23–28 μ m wide. Two small, compact prostate glands present; anterior one attached near junction between vas deferens and atrium, posterior one located near penial organ.

Spermathecae (Fig. 1E) totally about 135–160 long, with slender duct-like, at middle somewhat constricted, part, and pear-shaped, thin-walled ampullae; latter 55–70 μm wide, filled with non-organized sperm. Typical spermathecal vestibules not present, but outer (somewhat swollen) parts of ducts possibly homologous to such structures.

Remarks.—This new species differs from *Peosidriloides flabellifer* in several aspects. It has up to three or four setae in some anterior segments (setae two per bundle throughout body in *P. flabellifer*), its spermathecal pores are closer together ventrally (pores in line with ventral setae in *P. flabellifer*), its vasa deferentia appear dilated (vasa narrow throughout in *P. flabellifer*), and it has penis-like copulatory organs (atria opening directly to the exterior through simple pores in *P. flabellifer*).

With regard to the dilation of the vasa deferentia and the possession of penial organs, *P. hornensis* is similar to *Peosidrilus acochlearis* (Erséus & Loden, 1981), but the latter taxon is in other respects (with numerous somatic setae, distinctly clubbed penial setae, clitellum and vasa deferentia of normal length, and lateral spermathecal pores) a typical member of *Peosidrilus*. The resemblance may therefore be due to convergence.

Distribution and habitat.—Known only from Horn Island (northern Gulf of Mexico). Inter- and supratidal sand.

Discussion

Peosidrilus and *Peosidriloides* are both taxa with a more or less Northwest Atlantic distribution, at least by conclusion from the present records. Their general appearance seems to indicate phylogenetic membership in a larger group of phalloidriline genera extending across the North Atlantic to Europe and the Mediterranean and Black Seas; this larger group contains also *Adelodrilus* and *Bermudrilus*. The character patterns within

this larger group are, however, confusing, and it is probable that there is homoplasy (both convergence and reversal) in the location of spermathecal pores as well as in the morphology of penial setae (Erséus 1992).

Twelve of the thirteen species of *Peosidrilus* are known only from the east coast of the United States, including the Gulf of Mexico, and from the Caribbean (Erséus 1992; present paper). The genus thus appears to have undergone a unique radiation in this part of the Northwest Atlantic.

All previous records of *Peosidrilus* have been from either intertidal or continental shelf habitats. The present records of *P. biprostatatus* and *P. acochlearis* from a station 605 m deep indicate that the genus also occurs at bathyal depths.

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